

**Memo to William J. Sanders III  
Chairman & CEO, AMD**

**AMD vs. Intel:  
Analysis of an Ongoing Battle for Market Share**

**Strategic Considerations and Implications for AMD's  
Introduction of Its K7 Athlon Chip**



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## Executive Summary

Now that K7 has captivated the attention of industry analysts, experts and competitors, Advanced Micro Devices (“AMD”) needs to decide how to position this revolutionary chip. Given its competitive forces, there are three realistic strategies that AMD can pursue:

- 1) **Maintain:** focus only on the low-end market (sub-\$1000 PCs) and use the launch of K7 to protect and grow current market share in this segment. This strategy cedes the high-end market to Intel, signaling Intel to pull Celeron ® and Pentium ® II (“PII”) from the lower end.
- 2) Pursue **growth:** launch K7 into the high-end market and compete directly with Intel in this segment. Continue to produce K6 for sub-\$1000 PCs, but do not focus on launching a scaled-back version of K7. AMD can re-evaluate the market after 3-6 months to determine if a lower end version of K7 should be introduced.
- 3) Pursue **aggressive growth:** take an immediate two-tier positioning strategy when K7 is introduced to the market, comprising of K7 in the high-end and a low-end version of K7 for sub-\$1000 PCs. This is the strategy Intel has taken with Celeron and PII.

### *Recommendation*

Analysis suggests that AMD pursue **Option 2: Growth strategy.**

The enterprise market offers higher margins. AMD could leverage previous product success and capture a portion of this market. Currently, Intel poses the only real threat to AMD; however, analysts are already touting the better expected performance of K7 compared to PIII. This strategy allows AMD to continue to exploit K6’s success in the low-end market and has the embedded option value of waiting till deciding on a lower-end version of K7.

Positioning of K7 will require increased expenditures in building brand and distribution channels in high-end and investing in research and development (“R&D”). Careful pricing against Intel is crucial.

Lastly, now that AMD chips are to be incompatible with the Intel bus, relationships with chipset vendors require immediate attention. Other complementary developments could include partnerships with applications vendors.

Supporting details and information are provided in the following document.

### *Scope*

- The report focuses only on the introductory version of K7 at 600 MHz.
- It is recognized that Cyrix is almost equal to Intel in market share in the low-end [**Exhibit 1**]; the report does not analyze its competitive impact in depth.
- In analyzing competitive dynamics, primary focus is on Intel’s anticipated response and how it may re-define market share.
- Primary focus is limited to the PC industry with allusions to notebook and server segments.

## Company

### *Industry*

As 1998 comes to a close, AMD has proven itself to be a viable competitor against Intel. The success of K6 has redefined analyst and expert views of AMD, contributing to the growth of its market share over the past two years. Though analysts do not expect that AMD will overthrow Intel, general consensus over the past 18 months is that non-Intel chips will account for 25% of the market volume and 15% of market revenues by 2000<sup>1</sup>. AMD has positioned itself to take a large portion of this share.

A recent report shows that 34% of 2,624 companies surveyed are considering migrating to non-Intel chips<sup>2</sup>. This confirms new opportunities, and AMD must continue to build confidence with OEMs and consumers to increase sales.

Of the three market segments (high-end PCs, sub-\$1000 PCs, and servers), Intel dominates the high-end PCs, mostly sold in enterprises and retail markets. Most PCs in this segment are produced by large OEMs (Compaq, HP, IBM, Dell). The processor margins are relatively high, resulting from high quality and strong brand recognition.

The sub-\$1000 PC segment provides an economical alternative for price-sensitive customers, and lower margins for processor manufacturers. This segment captured about 27% of the entire PC market September 1998, and is expected to grow rapidly, capturing as much as 60% market share by 2000. AMD is currently the segment leader [Exhibit 1]; Intel and Cyrix are major competitors.

The server segment, which demands high-quality and powerful processors, is expected to grow rapidly over the next few years. Intel currently dominates this segment.

Aside from six major forces [Exhibit 2] impacting industry attractiveness, the Y2K issue has also become prominent. Its impact will be even stronger in 1999. Some purchasers have planned to replace entire systems prior to 2000, while others are focusing on resolving the issue with existing systems and plan to replace PCs after January 2000.

### *Limitations*

AMD faces four major limitations - manufacturing capabilities, complementary chip sets, financial constraints, and Intel's dominance.

*Manufacturing* complications have restricted AMD's past ability to meet demand and have hindered growth opportunities. Some PC manufacturers are skeptical about AMD's

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<sup>1</sup> "AMD takes on Intel with cheaper chip"; Financial Times; April 3, 1997

<sup>2</sup> ZD Market Intelligence survey of 2624 companies, Industry Week, September 9, 1998

ability to meet future demand<sup>3</sup>. Capacity expansions have helped curb this concern, but continual evaluation of constraints is necessary. Future growth and success are strongly correlated to OEM confidence in AMD's ability to balance supply with market demand.

AMD has used Intel-compatible *chipsets* for K6 and earlier chips, but cannot do so going forward. Thus, even though K7 as a microprocessor is ready for manufacturing, due to bus incompatibility with Intel chipsets, AMD is unable to take it to market until the chipsets are designed, tested, and ready for production. It is time-critical to build good relationships with chipset vendors.

Early demonstrations of K7 have resulted in favorable responses, and numerous workstation and server customers have expressed interest in designing their own chipsets for use in multiprocessor, K7-based systems<sup>4</sup>.

*Intel* has significantly more *financial resources* than AMD and other competitors. Intel has leveraged its financial clout in building brand equity through the expensive Intel Inside ® campaign and in limiting competition. So far, Intel has outdone AMD in generating cash flows, R&D expenses, OEM discounts, production capacity and marketing new products. Introduction of Celeron earlier in the year is yet another example of Intel's aggressive efforts in limiting AMD's growth.

AMD has moved out of being in Intel's shadow, now marketing a differentiated chip design. Previous success, by cloning Intel's x86 chips, was eliminated by the court ruling that AMD could no longer do so. This created challenges, but it has allowed AMD to evolve, grow, and differentiate as a true competitor in the microprocessor market. The next hurdle is gaining additional market awareness and confidence, in light of Intel's strong brand recognition.

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<sup>3</sup> John Thompson, a spokesman for Round Rock-based Dell Computer Corp., said, "Our concerns are whether AMD could deliver at the right time, and in the right volumes."; Intel waiting in wings to steal AMD's thunder, Electronic Buyer News; April 8, 1998.

<sup>4</sup> Interview with Dana Krelle, VP Marketing at AMD; Electronic Buyers News, November 23, 1998

## Alternatives

Going forward, AMD's primary goals are to gain additional market share and achieve sustained profitability. Three different go-to-market strategies are identified below, which may enable AMD to pursue these goals.

International and niche markets (such as for gamers), are additional sub-strategies to accompany any of the three identified options. Considered independently, these sub-strategies are insufficient to meet AMD's primary goals.

### *Option 1: Maintain*

Maintain focus only in the low-end market and use the launch of K7 to protect and grow current market share in this segment. This strategy cedes the high-end market to Intel, signaling Intel to pull Celeron and PII from the low-end.

### *Option 2: Growth*

Launch K7 into the high-end market and compete directly with Intel in this segment. Continue to produce K6 for sub-\$1000 PCs. AMD can re-evaluate the market after 3-6 months to determine if a lower end version of K7 should be introduced.

### *Option 3: Aggressive growth*

Pursue an immediate two-tier positioning as K7 is introduced - with K7 in the high-end and a lower end version of K7 for sub-\$1000 PCs. This is similar to the strategy Intel has taken with Celeron and PII.

### *International / Niche Markets*

Growth in international and niche markets are additional strategies that may be considered in conjunction with each of the above options.

## Analysis of Alternatives

With any of the aforementioned options, AMD must address its ability to meet demand. Currently, AMD is working on the requisite supply chain modifications to ensure that manufacturing can meet expected delivery and volume demand on time. Despite K6 family's acclaimed performance, recent problems with fabricating plants have created challenges to infiltrating the enterprises that are wary of AMD's ability to deliver. The new state-of-the-art Dresden plant, scheduled to open in January 1999, should help alleviate production problems.

Another challenge will be building chipsets to be used exclusively with K7. AMD should expend the necessary resources in developing these chipsets for K7's successful launch. Recent K6 sales have strengthened AMD's relationships with chipset and motherboard providers, which should be leveraged with the marketing of K7.

Lastly, the crux of the challenge remains in anticipating Intel's response to each alternative. In each instance, AMD has to be prepared to take measures that do not compromise its overriding goal of achieving sustainable profits.

To better understand each option, it is important to evaluate the market, industry, competitor reactions, and opportunities surrounding each.

### *Option 1: Maintain*

#### **Market**

- The low-end market is the fastest growing segment of PCs;
- AMD is already successful in this market;
- AMD has more established distribution channels than competitors;
- OEMs, frustrated with Intel's hold over them, would appreciate another provider;
- K7 provides a better migration path to new technologies (due to Socket 7 compatibility);
- Financial projections [Exhibit 3d] suggest that to achieve break-even in operating income, a modest growth in sales of 13.4% is sufficient in 1999, followed by a growth of 3.9% in 2000.

#### **Intel's Expected Response**

Intel may feel threatened by AMD's growth in this market and increase pressure as a low-end provider. This was witnessed in its introduction of Celeron after the success of K6.

Although this segment is not its strongest market, Intel has impressive name brand recognition. It also has manufacturing capacity to handle the growth stemming from this

market<sup>5</sup>. AMD's price structure in the low-end has traditionally been higher than Intel's. Intel may begin to compete on price with AMD in order to capture more market share. In addition, Intel may also attempt to change industry standards in an attempt to force out incompatible AMD chips (Intel was pushing for Slot 1 to be the standard rather than Socket 7<sup>6</sup>).

Alternatively, Intel may take AMD's strategy as a signal, cede this segment to AMD, and retain its premium market share in the high-end. Since both companies would be looking to maintain profits, this cessation from both sides might imply a tacit cooperation. Thus, other competitors aside, both would be able to charge premiums for their products. This could be a tactically brilliant move for Intel. By ceding this lower margin market to AMD now and allowing only limited growth for AMD's cash flows, Intel will be in a much stronger position to re-apply the dual branding strategy at a future time. Intel may even be able to use its financial strength to marginalize AMD, thus becoming the only real player in the industry.

### **Complements**

Falling costs of other components in the PC market would make the entire system more attractive to end consumers. This may be achieved through partnerships with application vendors, which will allow these partners to develop K7 compatible programs. This may not only maximize the performance of the chip, but also decrease development cost for vendors, as they will have K7's design specifications before the chip hits the market.

3DNow!<sup>TM</sup> has already proven to be a huge success. Thus, complementary components for graphic-use-intensive gamers and Photoshop® users would also aid growth of K7.

### **Alliances**

In order to promote and expand the K7 line in this segment, AMD should pursue relationships with white box OEMs, retail and other distribution channels, and game creators.

### **Challenges**

- This market is attractive to new entrants, thus competition is growing. Cyrix, Intel and a host of smaller players already pose threats;
- The nature of this market necessitates relatively low profit margins;
- K7 specifications are not indicative of a low-end product implying under-utilization of the chip's potential.

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<sup>5</sup> '...Intel expects to double production this quarter, to 8 million units -- more than the entire output of AMD, National, and a host of smaller competitors combined...'; Who Says Intel's Chips are Down?; Business Week; December 7, 1998.

<sup>6</sup> AMD Annual Report 1998.



## Option 2: Growth

### Market

- The enterprise segment commands high margins implying higher per unit revenue;
- Significant portion of executives would consider switching to a non-Intel processor;
- High-end consumers are more knowledgeable and appreciative of K7 capabilities;
- Greater opportunity to win accounts with brand name OEMs for their high-end systems; great for building AMD brand equity;
- Because of difficulty of entrance into this market and the high levels of expertise required, Intel is currently the only real competitor;
- AMD has already positioned K7 as high-end product, superior to and faster than the impending PIII;
- AMD can continue to exploit K6's success in the low-end;
- There is option value in ascertaining industry response to K7 and *then* investing in a low-end version of the 7<sup>th</sup> generation chip;

### Intel's Expected Response

Intel has a first-mover advantage, strong brand identity, and is known for reliability within the high-end market. With this strategy, AMD will pose a greater direct threat to Intel.

Theoretically, Intel should be indifferent as long as AMD maintains a minority stake in the market share and the cost of a price war is higher than Intel's loss in revenues<sup>7</sup>. However, Intel has a reputation of being brutal in its retaliation. Thus, if AMD challenges on price *and* differentiation, Intel is likely to respond with its own price cuts and slew of differentiated products within its 7<sup>th</sup> generation architecture. If AMD chooses a non-threatening price stance and focuses on product differentiation instead, Intel may rely more on its reputation, product innovations, and distributor and channel relationships to challenge AMD.

With a probable dual branding strategy in future, Intel is likely to be aggressive in both segments. However, since stakes are higher in the high-end, it is likely that retaliation in the low-end will be more moderate. Since AMD already has good brand equity in this segment, it is not likely to lose much market share. Thus, there is an upside for AMD in the high-end, but possibly limited downside in its existing market.

Alternatively, Intel may aggressively attack AMD's market share in the low-end in retaliation to AMD's move in the high-end. To mitigate this eventuality, AMD must be prepared to release a low-end version of K7 earlier than the 3-6 month suggested period. This option of having the flexibility to revise its strategy once AMD can gauge industry acceptance and Intel's response to K7 will have tremendous value for AMD in going forward.

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<sup>7</sup> R. Preston McAfee's Seminar: "War of Attrition"; December 2, 1998.

### **Complements**

AMD should pursue relationships with complement providers in the areas of 3D, video, software applications, and Internet (recent growth opportunities). Facing stricter competition, developing strong partnerships with chipset vendors will be more important than in Option 1.

### **Alliances**

There are better opportunities for co-branding and bundling with OEMs. Therefore, alliances with key OEMs such as Compaq, HP, IBM can help AMD gain market share. Current negotiations with Gateway are an important step in this regard. AMD also needs to develop new distributor and channel relationships.

### **Challenges**

- Lack of attention in the low-end may result in Celeron PIII cannibalizing AMD market share;
- If Intel feels too threatened, a price war may be waged;
- R&D needs to increase to be competitive – Intel will look for ways to differentiate (probably based on clock speed).
- Financials [**Exhibit 3d**] suggest that due to increased advertising and R&D expenses, AMD would need a growth of 16.5% in sales to break-even on operating income in 1999.

## ***Option 3: Aggressive Growth***

### **Market**

The aggressive growth strategy poses a greater risk for AMD and a bigger threat to Intel than the other strategies. This strategy allows AMD to:

- Defend market share in the lower end while trying to penetrate the high-end;
- Diversify existing product line;
- Exploit greater opportunities for branding;
- Offer various pricing and products that allows maintenance of a reasonable average selling price (“ASP”);
- Compete with K7 and a “watered down” K7 in the narrowing high/low-end product gap [**Exhibit 4**];
- Signal to Intel that AMD will compete head on in all markets.

### **Intel’s Expected Response**

Intel is the dominant player in the high-end market and a strong threat to AMD in the low-end. As such, Intel is unlikely to cede market share to AMD without a fight, especially, in the high-end. Price competition is likely to be fierce. Intel will also be much more aggressive in its chip architecture, differentiation, branding, building alliances and improving distributor relations. It may attempt using its supplier power to lock-in OEM’s and thus block AMD’s penetration. Unless AMD is careful about K7’s positioning, the end result is likely to be a loss for AMD on all fronts i.e. no foothold in the high-end and loss of competitive advantage in the low-end (due to dilution of interests and pursuits).

## **Complements & Alliances**

These would be the same as identified in Option 2.

## **Challenges**

- Previous technical problems limited effective capacity. Simultaneous production of K7 and a second version could pose production problems.
- AMD faces financial constraints. AMD currently does not have enough cash flow to support the aggressive marketing and advertising required to compete with Intel on such a large scale. Projections [Exhibit 3d] show that a high growth of 22.56% in sales is required to break-even on operating income in 1999.

## ***Extensions: International/Niche Markets***

### **Market (International)**

With demand for PC's increasing in the Asian emerging markets, it is an important area to target. AMD's alliance with Fujitsu on its flash memory products provides a good opening in the region, especially with other PC OEM's such as Toshiba. With Intel targeting Latin America and China, this can be a good non-threatening strategy<sup>8</sup>.

### **Challenge**

AMD should not risk an expansion it may not be able to support.

### **Market (Niche)**

- Market for gamers is small relative to total PC buyers; however, through increased popularity with gamers, AMD can leverage brand equity in other product segments;
- By emphasizing increased graphical capabilities over Intel, targeting publishers and Photoshop users is possible;
- AMD has first mover advantage through its 3DNow!™ technology, which is well regarded and has a growing installed base;
- With less direct threat to Intel, competition is likely to be low.

### **Challenge**

Small market size will limit AMD's long-term clout in the industry.

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<sup>8</sup> Who says Intel's chips are down?; Business Week December 7, 1998.

## Recommendation

Based on the analysis, AMD should pursue *Option 2* at this time. It allows AMD to penetrate a new segment, protect its current market, and expand in phases depending on industry response to its product and careful positioning<sup>9</sup>. This approach may also warrant a milder backlash from Intel than in *Option 3*. *Option 1* does not exploit K7's full potential and, thus limits opportunities for future growth.

In addition to suggestions provided, critical to *Option 2* is developing alliances already in place with HP and IBM. AMD should attempt to build relationships with disgruntled Intel customers. Furthermore, rising demand for notebooks and servers also presents further growth opportunities.

It is crucial for AMD to pay particular attention to K7's time to market. With both PIII and K7 expected to hit the market in the first half of 1999, first mover advantage can play a large role in the capture of market share. If PIII hits the market earlier, AMD not only has to fight against Intel's immense brand equity but also the installed base PIII would have achieved by that time.

At the same time, AMD cannot afford to lose focus on its core low-end market. This is where its high market share commands the company's major portion of revenues. Since Intel is likely to be extremely aggressive in pushing the PII Celeron *and* developing the PIII Celeron, AMD's current market share in the low-end may become precarious. Thus, if necessary, AMD may need to release a scaled-back version of K7 in the low-end before the suggested 3-month period is over.

Depending on the dynamics in the high-end, AMD can decide how much of the K7 it wants to continue pushing in the high-end versus how much it wants to sell in the low-end. If K7 does not out-perform PIII, as the industry currently predicts, AMD can limit, but not eliminate, distribution of K7 in the high-end and increase its attention on aggressive growth in the low-end. This will allow AMD to maintain its presence in the high-end, which it can leverage during introduction of subsequent generations of microprocessors.

### *Product Differentiation*

AMD must continue heavy R&D investing to differentiate K7 with superior features (higher clock speeds, ease of integration with complementary products, enhanced functionality). Additionally, if K6 loses clout upon the introduction of K7, AMD should re-consider creating a "watered down" K7 to compete directly with Celeron.

Furthermore, in expanding product segments (high-end PCs, notebooks, servers), AMD will need to identify applications that are most important to end users for these segments and develop partnerships with application vendors and OEMs for these areas.

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<sup>9</sup> Recall that this approach also provides AMD with tremendous option value.

### *Product Distribution*

Even though it has been plagued with manufacturing difficulties, AMD must be in a position to meet industry demand. This will help foster good distributor relations in the high-end, where AMD currently lacks partnerships. AMD can use Intel's dominating presence to its advantage by providing distributors a second sourcing, thus reducing Intel's supplier power.

### *Marketing and Branding*

Studies show that consumers are willing to pay higher prices for a brand they know and trust. Thus, building brand equity is more important than entering a price war. This has long-term benefits in 1) possibly reducing retaliation from Intel, 2) increasing perceived value and 3) creating opportunity for sustainable profits.

AMD's campaign should target not only OEMs, but also end users who are all too familiar with the Intel Inside campaign. It should also include various proposed co-branding initiatives with OEMs such as manufacturer incentives for ordering K7 PCs and bundling with motherboard and other vendors.

Internal restructuring and retraining of sales force is also required so that AMD has an integrated approach in its penetration of the high-end segment.

### *Pricing*

Intel's dominance and name recognition in the high-end market requires AMD to price its products lower than similar Intel offerings. The critical question is, 'How much lower?'

Were AMD to price higher than Intel, AMD's current lack of brand equity would prohibit them from gaining market share. On the same note, pricing at par with Intel, would allow AMD only a small portion of market share, if any.

Pricing too low instigates a price war, as Intel will retaliate strongly. Intel will unhesitatingly bear the higher cost of marginalizing AMD than let AMD penetrate too deeply into its current market share.

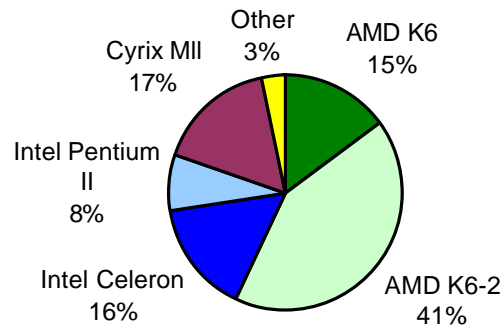
AMD will need to proceed cautiously and price at a point that allows some market share capture without posing a luminous threat to Intel. Theoretically, Intel will not retaliate if the costs of a price war far outweigh the benefits. This price point can be estimated using Intel's current market price, market share, and an approximation of its operating costs.

Regardless, AMD must remember that K7's positioning focus should be more on product differentiation than on price. Building brand equity is critical to AMD's long-term success.

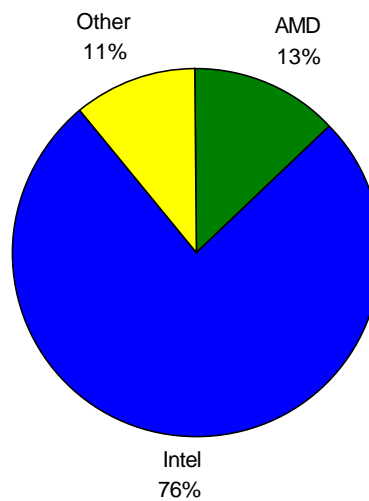
## Exhibits

### Exhibit 1: Microprocessor Market Share in 1998

**1998 Q3 Market Share of sub-\$1000 PCs by Processor**



**1998 Q3 PC Processor Market Share**



Source for both is Computer Reseller News, November 1998

## Exhibit 2: Six Forces analysis of Industry Attractiveness

### *The Six Forces*

**New Entrants:** Threat of entry is low. High fixed costs. Barriers to entry: Intel's reputation and OEM relationships; long and expensive R&D process; constantly changing technology; economies of scale; strong learning curve; patents; brand recognition; alliances with input suppliers needed. Switching costs are high.

**Buyer Bargaining Power:** Currently low because of Intel's brand recognition, consumer demand and the chip's ability to enhance the "value of the box." In short, buyers need the chips. Microprocessors are a valuable input and buyers are fragmented relative to suppliers. AMD has less bargaining power with buyers relative to Intel.

**Supplier Bargaining Power:** Currently moderate. In 1998, AMD and Intel need to forge good relationships with suppliers such as motherboard manufacturers and chipset vendors. With emerging price wars and growing differentiation between AMD and Intel products, suppliers are gaining more bargaining power. Nonetheless, Intel dominates the market and has been able to set standards, exerting its own power and dominance. AMD is gaining more clout.

**Threat of Substitutes:** Low. There are no substitutes for microprocessors and demand for faster chips is on the rise. Microprocessors are fueling growth for innovative products and applications that are more "user friendly" and realistic with the availability of better and faster chips. An emerging trend is the introduction of chips focused on niche markets, such as gaming, and growing sub segments of the microprocessor market, such as the low-end.

**Rivalry:** High. Intel will not cede market share beyond enough to keep justice department away; differentiation will be essential going forward. Continuing and intense price wars are an indication of high rivalry.

**Complements:** High and growing. Complements include the Internet, operating systems (such as Windows and Linux), servers, PCs, notebooks, handhelds, software vendors, bus technology, manufacturing capability/know-how; gaming applications, graphic applications (Photoshop), and a variety of end-user applications that require greater PC power.

### Exhibit 3a: Financial Projections for Option 1: Maintain Strategy 1999 - 2000

#### Pro-forma Income Statement

#### Base case: Maintain Strategy

	1996	Growth rate	CS <sup>b</sup>	1997	Growth rate	CS	1998	Growth rate	CS	1999	Growth rate*	CS**	2000	Growth rate	CS
<b>Net Sales</b>	\$1,953,019,000	-21%	100%	\$2,356,375,000	21%	100%	\$2,542,141,000	8%	100%	\$ 2,847,197,920	12%		\$ 3,416,637,504	20%	
Cost of sales															
Fixed Cost**	\$1,224,703,800	2%	63%	\$1,341,672,300	10%	57%	\$1,460,897,550	9%	57%	\$ 1,497,419,989	2%		1,549,829,688	3%	
Variable Cost	\$216,124,200		11%	\$236,765,700		10%	\$257,805,450		10%	\$ 284,719,792	10%	10%***	341,663,750.40	20%	10%***
	\$1,440,828,000			\$1,578,438,000			\$1,718,703,000			\$ 1,782,139,781	4%		\$ 1,891,493,439	6%	
<b>Gross Profit</b>	\$512,191,000	-51%	26%	\$777,937,000	52%	33%	\$823,438,000	6%	32%	\$ 1,065,058,139	29%		\$ 1,525,144,065	43%	
<b>Expenses</b>															
R&D	\$400,703,000	-4%	21%	\$467,877,000	17%	20%	\$567,402,000	21%	22%	\$ 577,886,363	2%	20%	\$ 708,861,913	23%	21%
Marketing, SG&A	\$364,798,000	-12%	19%	\$400,713,000	10%	17%	\$419,678,000	5%	17%	\$ 505,219,618	20%	18%	\$ 597,377,261	18%	17%
Total Expenses	\$765,501,000	-8%	39%	\$868,590,000	13%	37%	\$987,080,000	14%	39%	\$ 1,083,105,981	10%	38%	\$ 1,306,239,175	21%	38%
<b>Operating income (loss)</b>	(\$253,310,000)	-214%	-13%	(\$90,653,000)	-64%	-4%	(\$163,642,000)	81%	-6%	\$ (18,047,841)	89%		\$ 218,904,890	1313%	

#### Assumptions:

\* Assuming that the performance during 1996 is not representative of the normal course of business, growth rate is assumed to be 12% during 1999 and 20% during 2000

\*\*Given the nature of the industry, assume that 85% of the cost of sales is fixed costs.

Also assume that during '99 and 2000, FC increases by 2.5% and 3.5% respectively, corresponding to expected inflation. <sup>a</sup>

\*\*\*Assume that variable costs are 10% of sales

Others:

For R&D and SGA, costs are taken as % of sales. Determined by taking average of the last 4 years.

<sup>a</sup> Source: [www.clev.frb.org](http://www.clev.frb.org)

<sup>b</sup> Common-size statement



### Exhibit 3b: Financial Projections for Option 2: Growth Strategy 1999 - 2000

#### Pro-forma Income Statement

#### Option 2: Growth Strategy

	1998	Growth rate	CS <sup>b</sup>	1999	Growth rate*	CS**	2000	Growth rate	CS
<b>Net Sales</b>	\$2,542,141,000	8%	100%	\$ 2,923,462,150	15%		\$ 3,800,500,795	30%	
Cost of sales									
Fixed Cost**	\$1,460,897,550	9%	57%	\$ 1,497,419,989	2%		1,549,829,688	3%	
Variable Cost	\$257,805,450		10%	\$ 292,346,215	13%	10%***	380,050,079.50	30%	10%***
	\$1,718,703,000			\$ 1,789,766,204	4%		\$ 1,929,879,768	8%	
<i>Gross profit</i>	\$823,438,000	6%	32%	\$ 1,133,695,946	38%		\$ 1,870,621,027	65%	
<b>Expenses</b>									
R&D	\$567,402,000	21%	22%	\$ 598,973,787	6%	20%	\$ 778,665,924	30%	20%
Marketing, SG&A	\$419,678,000	5%	17%	\$ 554,007,296	32%	19%	\$ 720,209,485	30%	19%
Total Expenses	\$987,080,000	14%	39%	\$ 1,152,981,083	17%	39%	\$ 1,498,875,408	30%	39%
<i>Operating income (loss)</i>	<i>(\$163,642,000)</i>	81%	-6%	<i>\$ (19,285,137)</i>	88%		<i>\$ 371,745,619</i>	2028%	

#### Assumptions

\* Entering high-end with the option to grow in the low-end may result in better sales than the base case.

As such, growth rate is assumed to be 15% during 1999 and 30% during 2000

\*\*Given the nature of the industry, assume that 85% of the cost of sales is fixed costs.

During '99 and 2000, FC increases by 2.5% and 3.5% respectively, corresponding to expected inflation. <sup>a</sup>

\*\*\*Assume that variable costs are 10% of sales

Marketing Expenses for 1999 is 10% higher than is assumed for the base case. The same % is carried through to 2000.

Head-on competition with Intel & potential speed war will result in higher R&D. There is a 3% increase in R&D compared to the base case.

<sup>a</sup> Source: [www.clev.frb.org](http://www.clev.frb.org)

<sup>b</sup> Common-size statement

### Exhibit 3c: Financial Projections for Option 3: Aggressive Growth 1999 - 2000

#### Pro-forma Income Statement

#### Option 3: Aggressive Growth Strategy

	1998	Growth rate	CS <sup>b</sup>	1999	Growth rate*	CS**	2000	Growth rate	CS
<b>Net Sales</b>	\$2,542,141,000	8%	100%	\$ 2,796,355,100	10%		\$ 3,299,699,018	18%	
<b>Cost of sales</b>									
Fixed Cost**	\$1,460,897,550	9%	57%	\$ 1,497,419,989	2%		1,549,829,688	3%	
Variable Cost	\$257,805,450		10%	\$ 279,635,510	8%	10%***	329,969,901.80	18%	10%***
<b>Gross Profit</b>	\$1,718,703,000			\$ 1,777,055,499	3%		\$ 1,879,799,590	6%	
	\$823,438,000	6%	32%	\$ 1,019,299,601	24%	36%	\$ 1,419,899,428	39%	
<b>Expenses</b>									
R&D	\$567,402,000	21%	22%	\$ 642,866,466	13%	23%	\$ 758,582,430	18%	23%
Marketing, SG&A	\$419,678,000	5%	17%	\$ 529,920,022	26%	19%	\$ 625,305,626	18%	19%
Total Expenses	\$987,080,000	14%	39%	\$ 1,172,786,488	19%	42%	\$ 1,383,888,056	18%	42%
<b>Operating income (loss)</b>	(\$163,642,000)	81%	-6%	\$ (153,486,887)	6%		\$ 36,011,372	123%	

#### Assumptions

\* Dual positioning and entrance into a new market may result in marginally worse sales than a maintain strategy, growth rate is assumed to be 10% during 1999 and 18% during 2000 (Intel's aggressive response may hinder growth).

\*\*Given the nature of the industry, assume that 85% of the cost of sales is fixed costs.

During '99 and 2000, FC increases by 2.5% and 3.5% respectively, corresponding to expected inflation. <sup>a</sup>

\*\*\*Assume that variable costs are 10% of sales

Marketing Expenses for 1999 is 15% higher than is assumed for the maintain strategy. The same % is carried through to 2000.

Head-on competition with Intel & potential speed war will result in higher R&D.

There is a 3% increase in R&D compared to the base case.

<sup>a</sup> Source: [www.clev.frb.org](http://www.clev.frb.org)

<sup>b</sup> Common-size statement

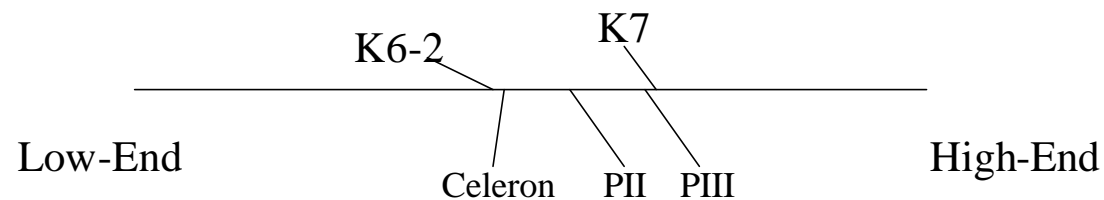
### Exhibit 3d: Sensitivity Analysis for Growth Rate in Sales 1999 - 2000

#### Two year Operating Income based on possible growth rate

		Growth Rate							Break - Even Growth Rate
		-10.0%	-6.0%	-2.0%	0.0%	2.0%	6.0%	10.0%	
<b>From Base Case</b>									
	<b>1999</b>								<b>13.37%</b>
Sales		\$ 2,287,926,900	\$ 2,389,612,540	\$ 2,491,298,180	\$ 2,542,141,000	\$ 2,592,983,820	\$ 2,694,669,460	\$ 2,796,355,100	\$ 2,881,932,775
Operating Income		(\$308,638,799)	(\$255,804,079)	(\$202,969,360)	(\$176,552,000)	(\$150,134,640)	(\$97,299,921)	(\$44,465,201)	\$0
	<b>2000</b>								<b>5.15%*</b>
Sales		\$2,562,478,128	\$2,676,366,045	\$2,790,253,962	\$2,847,197,920	\$2,904,141,878	\$3,018,029,795	\$3,131,917,712	\$2,993,782,279
Operating Income		(\$223,278,754)	(\$164,320,935)	(\$105,363,116)	(\$75,884,206)	(\$46,405,296)	\$12,552,523	\$71,510,342	\$0
* This is given 12% increase in sales in 1999. If growth in 1999 is 13.37%, break-even growth rate in 2000 is 3.88%.									
<b>From Option 2</b>		-10.0%	-6.0%	-2.0%	0.0%	2.0%	6.0%	10.0%	
	<b>1999</b>								<b>16.50%</b>
Sales		\$ 2,287,926,900	\$ 2,389,612,540	\$ 2,491,298,180	\$ 2,542,141,000	\$ 2,592,983,820	\$ 2,694,669,460	\$ 2,796,355,100	\$ 2,961,604,386
Operating Income		(\$340,618,801)	(\$289,205,414)	(\$237,792,028)	(\$212,085,335)	(\$186,378,642)	(\$134,965,256)	(\$83,551,870)	\$0
	<b>2000</b>								<b>4.85%**</b>
Sales		\$2,631,115,935	\$2,748,054,421	\$2,864,992,907	\$2,923,462,150	\$2,981,931,393	\$3,098,869,879	\$3,215,808,365	\$3,065,260,540
Operating Income		(\$219,508,322)	(\$160,382,928)	(\$101,257,534)	(\$71,694,837)	(\$42,132,140)	\$16,993,254	\$76,118,648	\$0
** This is given 15% increase in sales in 1999. If growth in 1999 is 16.5%, break-even growth rate in 2000 is 3.5%.									
<b>From Option 3</b>		-10.0%	-6.0%	-2.0%	0.0%	2.0%	6.0%	10.0%	
	<b>1999</b>								<b>22.56%</b>
Sales		\$ 2,287,926,900	\$ 2,389,612,540	\$ 2,491,298,180	\$ 2,542,141,000	\$ 2,592,983,820	\$ 2,694,669,460	\$ 2,796,355,100	\$ 3,115,719,091
Operating Income		(\$397,838,360)	(\$348,968,065)	(\$300,097,771)	(\$275,662,623)	(\$251,227,476)	(\$202,357,182)	(\$153,486,887)	\$0
	<b>2000</b>								<b>15.32%***</b>
Sales		\$2,516,719,590	\$2,628,573,794	\$2,740,427,998	\$2,796,355,100	\$2,852,282,202	\$2,964,136,406	\$3,075,990,610	\$3,224,769,259
Operating Income		(\$340,289,897)	(\$286,532,573)	(\$232,775,249)	(\$205,896,587)	(\$179,017,924)	(\$125,260,600)	(\$71,503,276)	\$0
* This is given 10% increase in sales in 1999. If growth in 1999 is 22.56%, break-even growth rate in 2000 is 3.5%.									

**Exhibit 4: Hotelling line****Hotelling Line Analysis**

High-End and Low-End Microprocessors:  
Based on (anticipated) speed as of 12/98



AMD's introduction of K7, coupled with Intel's Celeron, is increasingly blurring the distinction between low-end and high-end processors.